

## INTEROFFICE CORRESPONDENCE

139930

Piney River, Va. September 2, 1969

OFFICE BLDG/TUBE RMS DATE

TO: Piney River, Va.

ATTN. OF: Mr. J. F. Hopkins

COPY TO: Mr. J. J. Fitzgerald -NA  
Mr. Emil Hladky -NA  
Mr. R. N. Kelley -SA  
Mr. J. A. Robinson -SA  
Mr. C. W. Sieber -SA  
Mr. W. E. Trees -SA

SUBJECT: Waste Acid Recovery  
Savannah Plant

REFERENCE:

As requested by Mr. J. J. Fitzgerald, we have prepared a flow sheet for a waste acid recovery plant to produce 150 tons per day of 70%  $H_2SO_4$  (=105 tons 100%  $H_2SO_4$ ) from Australian ilmenite end liquor (20.0%  $H_2SO_4$ , 10.1%  $FeSO_4$ ).

This is a two-stage process. In the primary stage, end liquor is concentrated to 50% acid, at which point the iron sulfate is precipitated as  $FeSO_4 \cdot H_2O$ . The  $H_2SO_4 - FeSO_4 \cdot H_2O$  is filtered on a continuous rotary filter. The filter cake is essentially  $FeSO_4 \cdot H_2O$  and contains a large percentage of metals other than titanium found in the original ore. The filtrate is fed to the second stage where it is concentrated to 70%  $H_2SO_4$ . This acid is filtered through a precoated pressure filter before being returned to the process.

The Piney River Plant installed a heat exchanger type acid recovery pilot plant in 1952. The pilot plant was operated to study the effect of recycled acid on pigment quality and to obtain material of construction and operating data. The pilot plant had a maximum capacity of 10 tons per day 100%  $H_2SO_4$  (as 50%  $H_2SO_4$ ). Recovered acid has always been used at digestion to cut the 93%  $H_2SO_4$  to the desired acid concentration at reaction. During cold weather allowance is made for the steam added to heat the acid and to initiate or "speed up" the reaction.

The present plant was installed and operation started in 1959. The unit has a capacity to produce 30 tons per day 100%  $H_2SO_4$  (as 50%  $H_2SO_4$ ). The plant is operated to maintain full storage of acid at 56 - 58%  $H_2SO_4$  to supply digestion requirements. The present filter is operated less than 12 hours per day.

The attached flow sheet is based on our plant experience producing 45% to 58%  $H_2SO_4$  from Piney River ilmenite end liquor (21 - 22%  $H_2SO_4$ , 10.5 - 11.0%  $FeSO_4$ ) and our semi-pilot plant experience producing 70 - 72%  $H_2SO_4$  from 55% recovered acid. We have also had available Bound Brook experience with the drum concentrator and the results on waste acid recovery from several other operations.

200082

Mr. J. F. Hopkins

- 2 -

Waste Acid Recovery  
Savannah Plant  
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The major difference between Piney River and Savannah (#2 Plant) end liquor is its aluminum sulfate content. This may cause some difficulty at higher acid concentration since the aluminum sulfate forms a complex with  $H_2SO_4$ , making it difficult to recover that portion of the acid tied up with the aluminum. End liquor could be trucked to Piney River and processed through the recovery plant to determine what results could be anticipated at Savannah.

*Stephen A. Lamanna*  
Stephen A. Lamanna

SAL/jes

Attachment

200083

# SAVANNAH PLANT AUSTRALIAN ILMENITE

PRODUCTION: 150 TONS OF 70%  $H_2SO_4$   
105 TONS OF 100%  $H_2SO_4$

BASIS: (1) 90% OVERALL RECOVERY

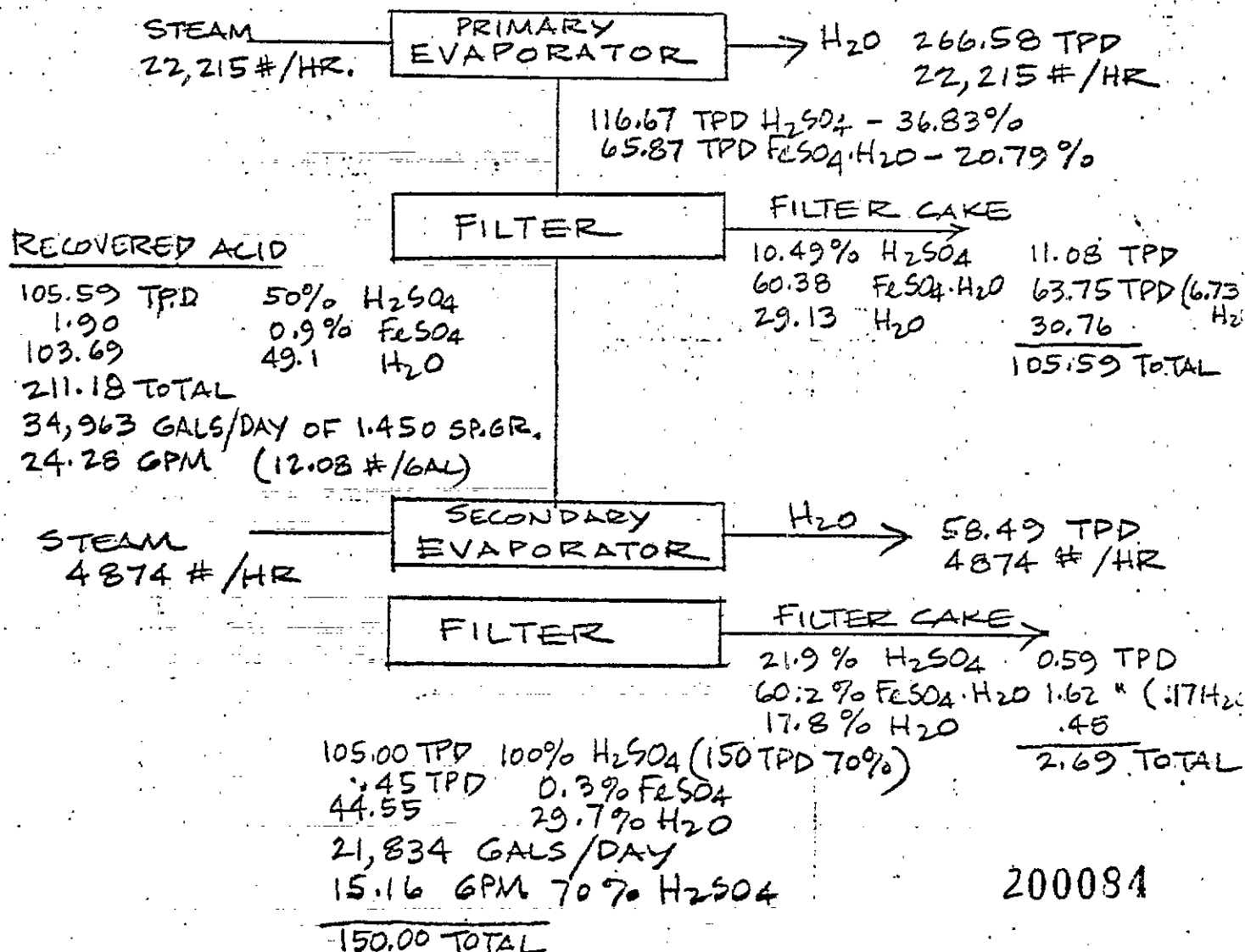
90.5% RECOVERY 1ST STAGE

99.5% RECOVERY 2nd STAGE

(2.) 1.0 LBS  $H_2O$  EVAPORATED / LB STEAM

## END LIQUOR

116.67 TPD  $H_2SO_4$  - 20.0%  $H_2SO_4$   
58.92 TPD  $FeSO_4$  - 10.1%  $FeSO_4$   
407.76 TPD  $H_2O$  - 69.9%  $H_2O$   
583.35 TPD FEED - 109,447 GALS/DAY  
76.0 GPM E.L. @ 1.280 SP.GR. (10.66#/GAL)



200084

END LIQUOR (WASTE ACID)  
ANALYSIS

	<u>Piney River Ilmenite</u>	<u>Savannah #2 Plant Australian Ilmenite</u>
H <sub>2</sub> SO <sub>4</sub> (Includes TiO <sub>2</sub> )	22.9%	21.0%
Available H <sub>2</sub> SO <sub>4</sub>	22.0	19.8
FeSO <sub>4</sub>	11.0	10.1
MnO	0.25	1.51
Al <sub>2</sub> O <sub>3</sub>	0.09	0.81
MgO	0.20	0.08
Cr <sub>2</sub> O <sub>3</sub>	0.032	0.08
V <sub>2</sub> O <sub>5</sub>	0.097	0.36
P <sub>2</sub> O <sub>5</sub>	-	0.14
Sol. TiO <sub>2</sub>	0.40	0.51
Sp. Gr.	1.3	1.28

200085

